

What is claimed is:

1. A variable gain amplifier having an input terminal and an output terminal, for amplifying a signal inputted to the input terminal to output the amplified signal, operating in a high gain mode or a low gain mode, comprising:
  - an amplifier element having a first terminal constituting the input terminal of the variable gain amplifier, a second terminal constituting the output terminal of the variable gain amplifier and a third terminal connected to a second power supply, wherein the amount and direction of current of the amplifier element, which flows from the second terminal to the third terminal, are varied based on the amount of a voltage applied to the first terminal;
  - 15 a wideband-matching element connected between the input terminal and the output terminal of the variable gain amplifier, for matching input impedance at a wideband upon the operation of the variable gain amplifier in the high gain mode;
  - an attenuator connected between the input terminal and the output terminal of the variable gain amplifier, for attenuating the input signal to output the attenuated signal to the output terminal upon the operation of the variable gain amplifier in the low gain mode;
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means connected to the first terminal of the amplifier element, for activating the amplifier element upon the operation of the variable gain amplifier in the high gain mode; and  
PN a load resistor connected between the <sup>second</sup> first terminal of the  
5 amplifier element and a first power supply.

2. The variable gain amplifier as claimed in claim 1, wherein the wideband-matching element includes a capacitor, an inductor, a resistor and switching means, wherein one end of the 10 capacitor is connected to the input terminal of the variable gain amplifier, the other end of the capacitor is serially connected to the inductor, the resistor and the switching means, and the other end of the switching means is connected to the output terminal of the variable gain amplifier.

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3. The variable gain amplifier as claimed in claim 1, wherein the attenuator includes a capacitor, a resistor and switching means, wherein one end of the capacitor is connected to the input terminal of the variable gain amplifier, the other end 20 of the capacitor is serially connected to the resistor and the switching means, and the other end of the switching means is connected to the output terminal of the variable gain amplifier.

4. The variable gain amplifier as claimed in claim 1,  
wherein the means for activating the amplifier element in the  
high gain mode includes switching means and a bias voltage.

5 5. The variable gain amplifier as claimed in claim 1,  
wherein the amplifier element is a MOSFET transistor, the first  
terminal of the amplifier element is a gate, the second terminal  
thereof is a drain, and the third terminal thereof is a source.

10 6. The variable gain amplifier as claimed in claim 1,  
further comprising a second amplifier circuit, including:

first and second amplifier elements each having a first  
terminal, a second terminal and a third terminal, wherein the  
amount and direction of current of each of the first and second  
15 amplifier elements, which flows from the second terminal to the  
third terminal, are varied based on the amount of a voltage  
applied to the first terminal;

first and second load resistors each connected between the  
second terminal of each of the first and second amplifier  
20 elements and a first power supply;

first and second current sources connected to the third  
terminals of the first and second amplifier elements,  
respectively;

a source degeneration variable resistor connected between the third terminals of the first and second amplifier elements; and

5 a load degeneration variable resistor connected between the second terminals of the first and second amplifier elements, wherein the first terminal of the first amplifier element is connected to the output terminal of the variable gain amplifier, the first terminal of the second amplifier element is grounded, and the second terminals of the first and second 10 amplifier elements form second negative(-) and positive(+) output terminals, respectively.

7. The variable gain amplifier as claimed in claims 1 or 6, further comprising a third amplifier circuit, including:

15 first and second amplifier elements each having a first terminal, a second terminal and a third terminal, wherein the amount and direction of current of each of the first and second amplifier elements, which flows from the second terminal to the third terminal, are varied based on the amount of a voltage 20 applied to the first terminal;

first and second load resistors each connected between the second terminal of each of the first and second amplifier elements and a first power supply;

first and second current sources connected to the third terminals of the first and second amplifier elements, respectively; and

a source degeneration variable resistor connected between 5 the third terminals of the first and second amplifier elements, wherein the first terminals of the first and second amplifier elements are connected to the second negative(-) and positive(+) second output terminals, respectively, and the second terminals of the first and second amplifier elements form third 10 negative(-) and positive(+) output terminals, respectively.